MPN-0001

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0035] with the following amended paragraph:

[0035] The channels flowing through the cooling plates of Figure 5 may extend from left to right as sensed in the Figure, a direction that runs parallel to the substrates 12a. The cooling fluid may be supplied to, and collected from, the channels by manifolds which will typically be situated at opposing sides of the package to accommodate a straight fluid flow path through the package. It will therefore be appreciated that the various communication apertures in the substrates 12a and cooling plates 14 permit signal communication between circuitry wafers in a vertical direction that is orthogonal to the planes in which coolant flows through the cooling plates in the package. Optionally, data input and output can be directed vertically through the package 10 (as sensed in Figure 5), whereas electrical power and (optionally) control functions can be provided in a horizontal direction (as sensed in Figure 5) that is orthogonal to both the direction of coolant flow and the vertical flow of data signal communication, i.e., in a direction perpendicular to the plane of the paper in which Figure 5 is depicted. Representing the IC package 10 schematically as a rectangular solid in Figure 6, the architecture of an IC package in accordance with this invention permits coolant to flow through the package 10 in a direction along a "Z" axis; power, data and/or control signals communication can be accommodated vertically through the top and/or bottom surfaces and/or vertically within the package, along a vertical or otherwise upward-directed "Y" axis, and/or horizontally along an "X" axis perpendicular or otherwise transverse to both the ~~Y and Z axes~~ Y axis and the Z axis. Power, data and control signals can be allocated to the X and/or Y ~~axes~~ axis in any desired manner and combination.

Please replace paragraph [0037] with the following amended paragraph:

[0037] Such inflow and outflow manifolds facilitate the flow of coolant through the package in a plurality of parallel planes that are disposed in perpendicular relation to the direction in which circuitry wafers and cooling plates are layered in the package. Thus,

thermal flow through the package is achieved in a horizontal direction orthogonal to the vertical direction in which circuitry wafers and cooling plates are layered. Power and signal communication with the package may be provided in the vertical direction and/or in a direction orthogonal to the vertical direction. By positioning an electrical connector between two coolant manifolds, signal communication may also be orthogonal to the vertical direction and to the direction of heat flow through the package. As shown, inflow coolant manifold 20a occupies only a 90-degree sector of the periphery of the IC package indicated by its circular footprint at IC package 10, and outflow coolant manifold 20b occupies a diametrically opposite 90-degree sector leaving two lateral 90-degree sectors available for lateral connection to a bus for electrical signaling (e.g., for control and/or power and/or data transfer) in a direction orthogonal to the direction of flow of coolant from one manifold to the other, at the regions indicated by arrows 22. Each of manifolds 20a and 20b has a concave face for mating with the stack. Each manifold face carries a deformable gasket material for contact with the stack. The gasket material is perforated in a manner calculated to allow coolant to flow therethrough into or out from the cooling plates and to establish a seal around each of the flow channels. As shown, the gasket material on manifolds 20a and 20b have perforations to match the openings of each flow channel in the cooling layers in IC package 10, but, in alternative embodiments, the gasket may be configured to form a seal around a plurality of such openings in a cooling layer. Accordingly, the circuitry wafers may be configured to include edges with I/O contact pads that protrude from opposite sides of the stack, to facilitate the use of a suitably configured modular electrical connector to that package. Likewise, in an alternative to what is shown in Figure 6A, the cooling plates may optionally be configured to protrude from the stack, to facilitate the connection of manifolds thereto. Such a connector and manifold are shown in Figures 6C and 6D, respectively.